

## **REMARKS**

Claims 1-31 are pending while claims 1-26 and 29-31 are rejected and claims 27 and 28 are objected to. The Applicants wish to cordially thank the Examiner for indication of the allowable subject matter with respect to claims 27 and 28. Claims 1-4, 11, 12, 14, 21, 23-25 and 31 have been amended leaving claims 1-31 for consideration upon entry of this amendment. No new matter has been added.

### **Specification Objections**

The objections concerning the informalities noted in the Detailed Action with respect to page 10, paragraphs [0040] and [0041] of the disclosure have been corrected in conformance with the suggestions of the Examiner. It is respectfully requested that the objection to the disclosure be withdrawn.

Paragraph [029] has been amended to reflect the single-ended (e.g., anode grounded) x-ray tube configuration with respect to claim 4 as originally filed. One skilled in the pertinent art would readily understand how the potentials are arranged in the manner claimed in claim 4. No new matter has been added.

### **Drawing Objections**

The drawings stand objected to under 37 CFR 1.83(a). The Examiner states that the drawings must show every feature of the invention specified in the claims, and therefore, the subject matter claimed in claims 3 and 14 must be shown or the feature(s) canceled from the claim(s).

It is respectfully submitted that Figure 2 clearly shows a first power supply (230) and a second power supply (232) of a power supply (210) as taught in the specification at least beginning at paragraph [0029] and claimed in amended claims 3 and 14.

The Examiner claims that the subject matter claimed in claim 4 must be shown or the feature(s) canceled from the claim(s). Figure 2 has been amended to show anode (206) referenced at ground potential while cathode (204) is connected to a negative terminal of the second power supply (232) as claimed in amended claim 4.

The Examiner claims that the field emission array and Spindt-type field emission array as claimed in claims 8, 9, 18, and 19 must be shown or the feature(s) canceled from the claim(s). Figure 2 shows where the source of electrons is located with respect to the cathode; specifically in that particular embodiment, the source of electrons is illustrated as a coiled wire filament. A narrative explanation of the same is provided in paragraph [0032]. Those skilled in the art would understand that the claimed emitters would be in the place of the coil wire filament since it is the coil wire filament, heated to high temperature, that provides the electrons for acceleration across the anode-cathode gap in the tube.

Accordingly, it is respectfully requested that the objections to the drawings be withdrawn.

#### **Claim Objections**

Claim 21 stands objected to because of the following informalities: line 4, "the" should be replaced by --an--. Claim 21 has been amended to reflect the appropriate correction as suggested by the Examiner. Thus, it is respectfully requested that the objection to claim 21 be withdrawn.

#### **Claim Rejections - 35 USC §112**

Claims 2, 12, and 24 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The Examiner alleges that the claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants respectfully traverse.

Claims 2, 12, and 24 have been amended to replace reference to "extraction voltage" with -- gap voltage--. Accordingly, it is respectfully requested that the rejection to claims 2, 12, and 24 be withdrawn.

Claims 8, 9, 18, and 19 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants respectfully traverse.

The Examiner states that claims 8, 9, 18, and 19 recite an x-ray tube that comprises a

photo-cathode and a Field emission array and that Figs. 5 and 6 show that electrons are generated by bombarding a photo-cathode with an optical energy carried by a waveguide. The Examiner further alleges that however, there is no teaching that a field emission array is disposed in the same x-ray tube and that as understood by persons skilled in the art, photo-emission and field emission are two different mechanisms for generating electrons. As discussed above, Figure 2 shows an electron source as a coiled wire electron emitter and that one skilled in the pertinent art would readily recognize substitution thereof with a field emitter array electron emitter device.

Claims 3 and 14 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverse.

The Examiner alleges that claims 3 and 14 recite a first power supply and a second power supply. However, it is unclear if these power supplies are part of the power supply recited in claims 1 and 11, or if these power supplies are separate from that power supply, *i.e.*, there are three power supplies. The examiner correctly points out that Fig. 2 shows a main power supply (210) that comprises two power supplies (230, 232).

Claims 3 and 14 have been amended to recite first and second power supplies -- of power supply -- (210), to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverse.

Figure 2 and corresponding description of the specification have been amended to show the cathode connected to a negative terminal of the second power supply (232) while the anode is referenced to ground potential in the absence or bypassing of the first power supply (230).

Accordingly, it is respectfully requested that the claims rejections with respect to claims 3, 4, and 14 be withdrawn.

#### **Claim Rejections - 35 USC §102**

Claims 1, 5-7, 10, 11, 15-17, 20-23, 25, 29, and 30 stand rejected under 35 U.S.C. §102(e) as being anticipated by Halavee (U. S. Patent No. 6,324,257 B1). Applicants

respectfully traverse.

With regard to claim 1, the Examiner alleges that Halavee discloses a pulsed power application system for an x-ray tube comprising: an x-ray tube (7) having an anode (8) and cathode (9); a power supply (22) configured to provide optical energy (light) and an anode-to-cathode gap voltage via electrical energy, wherein the optical energy and the gap voltage are pulsed (2, 30) resulting in a pulsed x-ray radiation; and a means for transferring the optical energy (4) and the electrical energy (3a, 3b) from the power supply to the x-ray tube.

It is respectfully noted that Halavee discloses **miniaturized x-ray tubes** that enable radiation treatment by locating the x-ray source **within a human body** in close vicinity to or inside of the area to be treated with X-rays. (See Abstract). Furthermore, Halavee discloses using **much lower voltage than known devices**, pulsed heat and high flux so as to reduce the heat which is produced and thus shortening treatment time of the subject. Col. 5, lines 35-37. More specifically, Halavee discloses that the anode 8 is charged to a high voltage (**10- 50 kV**) by means of one of the conductors 3 a, 3 b from the voltage power supply 1 or voltage pulse generator, and the **photocathode 9 is kept**, together with the capsule 7, **at ground potential**. Col. 6, lines 62-66. The Examiner admits in the Detailed Action that Halavee teaches the anode is connected to a high voltage and the cathode is connected to the ground (column 7, lines 24-30). Moreover, Halavee discloses that the insulated X-ray source is preferably replaceable and disposable unit for avoiding complex sterilization processes. Col. 6, lines 26-28. This is quite unlike the diagnostic imaging apparatus claimed.

Halavee does not teach or suggest, and in fact teaches away from, a x-ray tube configured for diagnostic imaging; a power supply configured to provide optical energy and an anode-to-cathode gap voltage via electrical energy, said anode-to-cathode gap voltage is greater than 150kV, as in claim 1 and similarly claimed in claims 11, 21, 23, and 25. Thus, claims 1, 11, 21, 23, and 25, including claims depending therefrom, i.e., claims 2-10, 12-20, 22, 24, and 26-30, define over Halavee.

#### **Claim Rejections 35 USC 103**

Claims 3, 13, and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Halavee (U. S. Patent No. 6,324,257 B1) as applied to claims 1 and 11 above, and further in view

of Farrall *et al.* (U. S. Patent No. 5,008,912). Applicants respectfully traverse.

With regard to claims 3, 13, and 14, the Examiner alleges that Halavee disclosed the x-ray tube of claims 1 and 11. Further, the Examiner alleges that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the power supply according to the above configurations, since a person skilled in the art would recognize that these configurations are equivalent as long as the gap voltage, the relative voltage between the anode and the cathode, provides enough potential difference to accelerate the electrons to sufficient kinetic energy to produce x-rays when the electrons impact the anode target.

It is respectfully noted that claim 3 depends from claim 1, while claims 13 and 14 depend from claim 11, which are both submitted as being allowable for defining over Halavee as discussed above. Furthermore, it is respectfully noted that use of connecting the anode to a positive terminal of a first power supply and connecting the cathode to a negative terminal of a second power supply allegedly taught in Farrall *et al.* does not cure the deficiencies noted above with respect to Halavee. Moreover, Farrall *et al.*, like Halavee, do not teach or suggest, a gap voltage **greater than 150 kV**.

Claim 26 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Halavee (U.S. Patent No. 6,324,257 B1) as applied to claim 25 above, and further in view of Fehre *et al.* (U.S. patent No. 6,418,191 B1). Applicants respectfully traverse.

It is respectfully noted that claim 26 depends from claim 25, which is submitted as being allowable for defining over Halavee as discussed above. Furthermore, it is respectfully noted that use of the electrical conductors configured to optimize skin effect allegedly taught in Fehre *et al.* does not cure the deficiencies noted above with respect to Halavee.

Claim 31 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Halavee (U. S. Patent No. 6,324,257 B1) in view of Fehre *et al.* (U. S. Patent No. 6,418,191 B1). Applicants respectfully traverse.

It is respectfully noted that claim 31 has been amended to include the subject matter of claim 28 indicated as being allowable as the prior art fails to teach or suggest that the electrical conductor is configured to use a transmission line effect of a pulse train of power to maximize voltage at the x-ray tube as claimed.

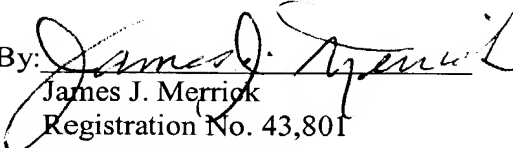
Accordingly, it is respectfully requested that the rejection with respect to claim 31 be withdrawn.

**Conclusion**

In view of the foregoing, it is respectfully submitted that the instant application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance issued. If the Examiner believes that a telephone conference with Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is cordially requested to telephone the undersigned.

In the event the Commissioner of Patents and Trademarks deems additional fees to be due in connection with this application, Applicants' attorney hereby authorizes that such fees be charged to Deposit Account No. 07-0845 maintained by Applicants' Assignee.

Respectfully submitted,

By:   
James J. Merriok  
Registration No. 43,801  
Customer No. 23413

Date: April 8, 2004  
Address: 55 Griffin Road South Bloomfield, CT 06002  
Telephone: (860) 286-2929